

Healthy Facts of Organic Food

Bavec M¹, Bavec F^{1*}, Bavec A² and Robačar M¹

¹Faculty of Agriculture and Life Sciences, University of Maribor, Slovenia

²University Rehabilitation Institute Republic of Slovenia, Slovenia

***Corresponding author:** Bavec F, Faculty of Agriculture and Life Sciences, University of Maribor, Pivola 10, Hoče/Maribor, Slovenia



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Abbreviations: OF: Organic Food; DDT: Dichlorodiphenyltrichloroethane; PCDD: Polychlorinated Dibenzofurans; GMOs: Genetically Modified Organisms

ABSTRACT

Generally understood that healthier properties of organic foods are result of specific agriculture practice without use of synthetic pesticides and fertilizers, antibiotics, hormones, additives, genetic modified organisms, nanotechnology or changed molecular structures in food caused by ionizing radiations. The main fact for consumers is that there is no doubt of negative effects of prohibited materials in organic agriculture on human health. Several studies showed positive effect of organic agriculture on individual health promoting compounds in organic food compared to conventional (ie. polyphenols, polyunsaturated fatty acids, some vitamins, minerals), but studies of organic foods as health factor are very limited with numerous 'pro et contra' findings and arguments. The fact is that diverse organic plant origin food from diverse crops in rotation has richer nutritional value, especially bioactive compounds. Just a few long-term studies with a high number of respondents show clear benefits, like less allergic symptoms, positive effects on pregnant and breast women, on child's neuro-behavioural development and on intelligence quotient due to use of pesticides.

Background

The general fact is that organic food (OF) production protect nature, takes care for animal welfare and contributes to human health. OF represents approved, certified and clearly labelled food, where is not allowed to use synthetic chemicals like pesticides, quickly soluble fertilizers, hormones, preventive antibiotic treatments, products from nanotechnology and transgenic - genetically modified organisms (GMOs) and products produced from or by GMOs. In organic food processing there is also restriction of the use of food additives and ionizing radiation maintaining a true nature of the product. Public preferences and interactive - controlled transparency are increasing consumer preferences for organic farming and food. In 2017, 181 countries were involved into organic production, with 69.8 million hectares and market size of 97 billion US dollars. In 2017, 11.7 million hectares or 20 percent more is reported compared with 2016 [1]. One of the most important reasons for increasing demand in consumption of organic foods are health related aspects [2,3]. Numerous factors influence human health, mainly without clear identification. The

health outcome of organic vs. conventional food consumption need to be carefully adjusted because of differences in lifestyle patterns (organic consumers are more physically active and less likely smoke) and different diets (in organic diet is usually less meat, and more fruits, vegetables, legumes, beneficial oils and whole grains).

However, long-term studies with large sample of analyzed population in studies to identify potential positive correlations between organic food and health are lacking, because of no financial support for this kind of studies. Two of studies concluded that children on biodynamic diet had a lower prevalence of allergic symptoms [4-6]. Consumption of organic dairy products by the mother during pregnancy and during infancy was associated with 36% reduction in the risk of eczema at the first two years of child life [7]. But in mentioned studies is not possible to identify separately the effects of organic diet and other lifestyle factors. The fact is that both factors have beneficial effects on less overweight and obesity among adults, reduction in the risk of non-Hodgkin lymphoma [8]. The aim of the paper is to describe shortly an extensive research

(key word 'organic food' is cited in SCI Direct 408,282 times and in combination with 'health' 179,967 times), their 'pro et contra' findings and give an overview what are healthy facts for increasing organic food consumption.

Nutritional Value and Bioactive Compounds of Organic Foods

Overall is known and also an extensive review [9] based on 271 sources reported that nutritional differences among conventional and organic crops are limited, if we compare standard crop products like maize, wheat, rice, potato and consumption of fast food meals based on meat, carbohydrates and fats. We cannot change significantly basic nutritional compounds in case of plant or animal species with changing production system. But crop production based on rich crop rotation includes different less underutilized crops from the past can bring richer compounds of diets, with numerous benefits with healthy effects [10,11]. Especially are great differences in case of oils. But also in standard foods, like organic vegetables are found out higher contents of bioactive compounds and antioxidant activity [12], phenolic compounds in vegetables and fruits (even 20% higher), and in meat omega-3 fatty acids [13]. The content of omega-3 fatty acids can be influenced only with free range system - it is a rule in organic farming.

Different Understanding Long Term Rests of Pollutants and Heavy Metals in Organic Foods

In this context several studies showed very misleading, unclear or contradictory results. The existing system does not solve mistakes happened in conventional and industrial agriculture practice or problems of industrial soil pollution in some regions. If in the past persistent and toxic pesticides, like hexachlorobenzene, dichlorodiphenyltrichloroethane (DDT), dieldrin, lindane etc. were used, the residues can be found in organic and in conventional foods till the end of their degradation [14]. If the production place is contaminated with environmental pollutants such as polychlorinated biphenyls (PCBs), polychlorinated dibenzofurans (PCDD/FS) or polychlorinated-p-dioxins [15] is clear that existing organic system could not improve mistakes from the past immediately, the live organisms will incorporate the rests in the organic material as long as they are present in the environment.

Similar, uptake of heavy metals depends on pollution of environment in the region, soil pH and oxidation reduction processes and physiological pathways, use of pesticides and fertilizers - even natural fertilizer (raw phosphates allowed in OA contain Cd). Generally, in the polluted environmental conditions among production systems and toxicology of foods is practically impossible to interpret differences and environmental evaluation is done before conversion to OA. Research without extensive critical assessment may result in wrong conclusions and understanding. For example, it is clear that there is no heavy metals in organic foods fertilized by natural materials like organic manure or compost, but it can be for example using biochar produced from wastes. Especially

for DDT, as a first pesticide with recognized negative effect is known that it has carcinogenic properties. The most important indication for human health show that organic crops have lower content of cadmium than conventional where are used mineral fertilizers, which mostly contain also cadmium ingredients [7].

Actual Pesticides Rests in Organic Foods

If there is just a 10 % truth about negative facts of pesticides [16] the situation in this case is very problematic. Once again, in organic production and processing is not allowed to use different synthetic compounds, which are the new source of residuals in nature and in foods. The simple understanding is, if there is no use or and there is no contamination from the neighbors, the foods would not contain residues. In this case, analyses of urinary pesticide concentrations (like organophosphorus, pyrethroid, 2,4-D and azole) shows that residual concentrations in the urine are in a significantly lower frequency (or no) contamination in organic diet compared to conventional, by children [17] and by adults [18-21]. It is clear that from health science exposure to synthetic pesticides may result in endocrine-disrupting, neurotoxic or carcinogenic properties. Exposure to some pesticides is positively correlated with the risk of non-Hodgkin lymphoma [22-24] and atherosclerosis [25]. Research paper [26] recommended organic food as beneficial for pregnant and breastfeeding women. Extensively studied exposure to different pesticides (authors assume that even Ambiental in distance 2000 m) during pregnancy period is associated with negative effects on neuro-behavioural development [26], like autism [27] and on intelligence quotient [28,29]. As consequence of reduced pesticide exposure, consequently organic food helps to avoid negative health effects and reduce external costs of pesticide use [30].

Transgenic Compounds

In organic food GMO and products produced from or by GMOs are prohibited. But scientifically exist a few 'pro et contra' results and opinions [31]. Additional (for some who contradictory Seralini study) the tumors were caused by GMO feed by rats and associated to glyphosate-based herbicides. According to the report [6] the further studies of effects on endocrine-related effects and gene toxic levels are needed [32]. However, it is taboo regulated by EU Commission base on 'principle of precaution'.

Rests of Hormones, Antibiotics and Additives

In animal origin organic food production is ban in using hormones and preventive antibiotics treatments compared to prevalent use in conventional animal husbandry which results in resistance to some antibiotics among society [9]. In food processing are also restrictions in using different synthetic additives (ban of chemical and GMO). The resistance on antibiotics is the main problems of industrial animal production, which risk of developing resistance is low in organic farming systems. There is no evident data of health risks for humans due to use of hormones for periodic fertilization of animals in intensive farms, but on the other hand

exists a lot of negative evidences in case of artificial additives in conventional (non-organic) foods.

Other Facts

Experimental in vitro studies differ biological activities in organic and conventional foods in various animal cell models and on immune system. This kind of findings gave some indications of different effects on cell, but do not allow strong conclusions and have not been translated into hypothesis of negative influence on humans [8].

Conclusion

Consuming healthier compounds and avoiding negative effects of artificial compounds and factors in organic food production is a basic healthy fact from general consumer perspective. Another fact for more organic diets is new scientifically confirmed benefits, even due to numerous interdisciplinary and usually long term influences of different compounds and processes associated with organic foods on human health exist a lack of information. The fact is also that human health is associated out with healthier living style in uncontaminated environment.

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